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# Visual Status of Professional Drivers in Eastern Nepal

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## Abstract

**Introduction:** Vision is the main sensory input to the brain for driving. Other aspects of visual function like color vision, contrast sensitivity, visual field, night vision, etc and not merely visual acuity should be evaluated before issuing a driving license.

**Objective:** The objective of the study was to determine the visual status of the professional drivers in Eastern Nepal.

**Method:** A cross-sectional descriptive study was carried out to assess visual functions like visual acuity, color vision, contrast sensitivity and visual field in 172 drivers who drove long haul commercial passenger vehicles.

**Result:** More than half of the drivers (51.2%) belonged to the age group 31-40 years. On evaluation of distance Visual Acuity, only one person had uncorrected visual acuity ≤ 6/18 in the better eye. Color vision anomaly was present in 2 persons (1.2%).

**Conclusion:** Visual status of the professional drivers in Eastern Nepal was normal on assessment of the different visual functions.

**Keywords:** Commercial driver; Eastern Nepal; Road traffic accident; Visual status

## Introduction

In recent years there has been a sharp rise in the number of registered motor vehicles in Nepal and so is the number of road traffic accidents. In 2013 the number of registered road traffic accidents were 13,852 with 1,816 fatalities.[1] Cause of road traffic accidents is multifactorial yet human error is considered to be the most important factor.[2] About 95% sensory input required to the brain for driving comes from vision.[3] Therefore assessment of vision becomes one of the important aspects of medical fitness before issuing or renewing a driving license. Though visual acuity is the most commonly employed screening test for issuing a driving license, other aspects of visual functions should be evaluated with importance as well.[4] Visual functions like distance visual acuity, visual field, contrast sensitivity, glare, night vision, motion perception and dynamic visual acuity are all important for the successful performance of driving.[5]

Though there is a global rise in the rate of road traffic accidents, there is a disproportionately greater rise in the developing countries.[6] Although statutory medical examinations are required for commercial passenger vehicle drivers, the medical examinations conducted are not up to the required standard.[2] In a country like Nepal, the medical test performed before issuing or renewal of a driving license is not of the proper standard and barely the distance visual acuity is checked in such medical tests to determine the visual status. The visual status of professional drivers, who drive most of the time and a large number of people are travelling with them, is unknown.

The objective of the study was to determine the visual status of professional drivers in Eastern Nepal.

## Method

A cross-sectional study was conducted among professional drivers who drove long haul passenger vehicles and were asked to visit Ophthalmology OPD at BPKIHS to have their ocular examination. The study was carried in the year 2018-2019 over a period of one year. The drivers underwent visual acuity assessment, refraction, color vision, contrast sensitivity and automated visual field assessment.

This study considered 95% CI and 80% power to estimate the sample size. For this purpose, the study considered 3.3 % prevalence of drivers with reduced visual acuity.[8] There were about 200 drivers who drove long haul passenger vehicles from Dharan. Finite population sample size formula was used to calculate the sample size. A total of 172 consecutive drivers with a valid license and who drove long haul commercial passenger vehicles at the time of the study were enrolled in the study.

Data was collected and recorded in the pro forma. Visual acuity was recorded using the Snellen and Jagger's chart for near and distance vision. Color vision was recorded with Ishihara color vision chart and visual field recorded with automated Humphrey Visual Field Analyzer. Contrast sensitivity was measured using the Peli Robson chart projected on Auro electronic chart. All the tests were carried in the eye with better distance visual acuity.

Collected data were entered in Microsoft Excel and statistically analyzed by SPSS 16. Ethical clearance was obtained from the Institutional Review Committee, BP Koirala Institute of Health Sciences.

## Result

Visual status of 172 professional drivers were evaluated.

Age distribution of the drivers was as shown in table 1. Most of them (51.2%) belonged to the age group 31-40 years.

**Table 1.** Age distribution of drivers (n=172)

| Age group | n(%) |
|---|---|
| <31 years | 13(7.6) |
| 31-40 years | 88(51.2) |
| 41-50 years | 64(37.2) |
| >50 years | 7(4.0) |

Uncorrected Visual Acuity (UCVA) and Best Corrected Visual Acuity (BCVA) for distance in the better eye is summarized in table 2. Only one person had visual acuity ≤ 6/18 in the better eye. Two persons used glasses for their distance vision correction.

**Table 2.** Distance visual acuity distribution and use of glasses in drivers (n=172)

| Visual Acuity in the better eye | Number for UCVA (%) | Number after BCVA | Use of glasses |
|---|---|---|---|
| 6/6 | 158 (91.9) | 169(98.2) | NA |
| 6/9 | 11(6.3) | 2(1.2) | 0 |
| 6/12 | 2 (1.2) | 1(0.6) | 1 |
| 6/18 | 1(0.6) | 0(0) | 1 |

UCVA and BCVA for near acuity in the better eye was as shown in table 3. Eight persons used glasses for their near vision acuity correction.

**Table 3.** Near visual acuity distribution and use of glasses (n=172)

| Visual Acuity in the better eye | Number for UCVA (%) | Number after BCVA | Use of glasses |
|---|---|---|---|
| N6 | 139 (80.8) | 171 (99.4) | NA |
| N8 | 21 (12.2) | 0 (0) | 2 |
| N10 | 10 (5.8) | 1 (0.6) | 5 |
| N12 | 1 (0.6) | 0 (0) | 1 |
| N18 | 1(0.6) | 0 (0) | 0 |

On testing of color vision, deuteranomaly and deuteranopia were observed in 1 person each.

Contrast sensitivity distribution was as shown in table 4. Only 7 persons had contrast sensitivity less than 1.65 log units.

**Table 4.** Contrast sensitivity distribution among the drivers (n=172)

| Contrast sensitivity (log) | n(%) |
|---|---|
| 1.35 | 1(0.6) |
| 1.5 | 6(3.5) |
| 1.65 | 45(26.1) |
| 1.8 | 119(69.2) |
| 1.95 | 1(0.6) |

On evaluation of the visual field, all persons had normal visual fields except one, who had inferior nasal step visual field defect.

Only 13 persons had visited eye clinics since they started driving as their profession and 10 of them had visited for vision related problems (Table 5). None had visited an eye clinic for routine screening purposes.

**Table 5.** Ocular examination of drivers (n=172)

| Last examination | Number (%) | Reason for examination | Number |
|---|---|---|---|
| < 6 months | 4 (2.3) | Regular visit | 0 |
| 6 months to 1 year | 4 (2.3) | Vision related problem | 10 |
| > 1 year | 5 (2.9) | Other ocular problem | 3 |
| None | 159 (92.5) | No visit | 159 |

## Discussion

In Nepal, a study on the visual status of professional drivers has not been conducted to date. As there are no stringent regulations related to visual status to qualify for a driving license, merely distance visual acuity is measured which usually do not follow the standard assessment guidelines. There is no practice of evaluating other visual functions before issuing or renewal of a driving license. So knowing the visual status of drivers may help to regulate a standard visual status that one should fulfill before obtaining or renewing a driving license.

The study revealed that the majority of the drivers were in the age group 31-40 years. Many studies have shown that commercial drivers in the developing countries are young.[7]

Only one person had uncorrected visual acuity for distance 6/18 or less than 6/18 in the better eye and rest 99.4% had visual acuity 6/12 or more than 6/12 in the better eye. Other studies done in Nigeria and urban Africa also showed that more than 95% drivers had visual acuity 6/12 or better.[8,9] Most countries and jurisdictions consider BCVA 6/12 in the better eye as a driving license endpoint.[10] All drivers had BCVA for distance 6/12 or better in this study. The high percentage of drivers having good visual acuity may be attributed to the young population of the drivers and examination of the better eye.

On evaluation of the near vision acuity 80.8 % had N6 vision. Glasses for near vision were used in 4.6% of the drivers. Though near vision acuity does not have a role in driving, use of

presbyopic glasses may indicate the awareness regarding eye health and the attitude to seek eye health services for other ocular problems.

On the assessment of color vision, 2 (1.2%) persons had color vision anomaly. This was similar to a study where 2.2% of new drivers had congenital color defect vision, which also assessed color vision with Ishihara color vision chart.[3] Color vision tests are not performed all over Nepal while assessing medical fitness for driving and a study from Nepal has recommended to consider it as a prerequisite before issuing a driving license.[11]

Inferior nasal step visual field defect was observed in only 1(0.6%) person. The horizontal visual field is important in driving and many studies have shown a narrowing of the peripheral visual field can hamper the driving performance.[12, 13]

On examination of contrast sensitivity, only 4.1% of the drivers had contrast sensitivity less than 1.65 log units. Studies have reported considerably greater risk of involvement in road crashes for drivers with the Pelli-Robson contrast sensitivity below 1.25 log units.[14] In this study, none of the participants had a contrast sensitivity of less than 1.25 log units. This could be ascribed to the relatively younger age of the drivers in the commercial vehicles.

Only 13 (7.5%) persons had undergone formal ocular examination at eye clinics or health institutions. None of them had gone for regular follow up. They visited only when they had a vision related issue or had some other ocular problem. This indicates that gradually progressive diseases may be undetected until profound visual loss. So detailed ocular examination at the time of issuing a license and periodic examination should be mandatory thereafter.[15]

The limitation of the study was that certain factors of the visual status like depth perception, motion perception, night vision were not evaluated in this study.

## Conclusion

Visual status of most of the professional drivers in Eastern Nepal were normal on evaluation of the different visual functions. Most of them did not go through detailed ophthalmic examination as a part of medical fitness before issuing a driving license or renewal of the driving license.

## Conflict of interest

The author declares no conflict of interest.

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